

Report of the Missouri Poultry Industry Committee

Pursuant to SCR47, the Missouri General Assembly requested a group of 27 Missourians to “

“...review and evaluate both the economic impact of the poultry industry, waste disposal issues and environmental impacts of this industry, and make recommendations on further action or legislative remedies, if any, to be taken as necessary; ...”

Attached is the final report which was unanimously approved by the Committee at a meeting on December 3, 2003.

(signed)

Floyd Gilzow, Chair
Missouri Poultry Industry Committee

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Table of Contents

Transmittal Page
1

Table of Contents
2

Issues Overview
3-4

Recommendations to the State Legislature
5-6

Recommendations to Other Entities
6-7

Appendix

Report of the Poultry Industry Viability Subcommittee
8-15

Report of the Environmental Impact Subcommittee
16-24

Report of the Litter Issues Subcommittee
25-36

Text of Senate Concurrent Resolution
37-39

The Value of Recycled Poultry Litter
University of Missouri Outreach and Extension
40-42

State of Missouri Soil Amendments Law
43

Report of the Missouri Poultry Industry Committee

The Poultry Industry in Missouri is a multi-billion dollar industry that provides over 13,000 direct jobs to Missourians throughout the state. A University of Missouri study shows that the direct and indirect impact of the industry in the 10 counties in Southwest Missouri amounts to \$1.78 billion dollars. This industry is the financial cornerstone of many smaller Missouri communities both in Southwest and Central Missouri and allows thousands of families to financially remain on their farms.

At the same time, serious questions have arisen regarding the environmental impact of this industry in this region of the United States. This is especially true in Southwest Missouri where there are concerns over the correlation between the poultry industry in the Ozarks and water quality. Abundant clean water in the area's rivers and lakes is a foundational ingredient for the one billion dollar tourism and recreation industry in the Ozarks.

The Missouri General Assembly established the Poultry Industry Committee under Senate Resolution SCR47 composed of 27 members who are responsible for submitting recommendations to the State Legislature on or before December 31, 2003. The committee was directed to:

“...review and evaluate both the economic impact of the poultry industry, waste disposal issues and environmental impacts of this industry, and make recommendations on further action or legislative remedies, if any, to be taken as necessary; ...”

Meetings have been held in Mt. Vernon, Springfield and Jefferson City on several occasions as the committee conducted its deliberations and to seek public input.

Based on the charge to the committee outlined in SCR47, the committee has divided itself into three working sub-committees:

1. Economic Viability of the Poultry Industry
2. Alternative Uses for Poultry Litter
3. Environmental Impacts of the Poultry Industry

Contained in this report are the final recommendations unanimously adopted by the committee in open session as well as the sub-committee reports to the full committee to support their individual recommendations.

The committee believes that an economically vibrant poultry industry and effective protection of high quality surface water are compatible. However to accomplish this goal, state and local regulators must have increased flexibility to consider and approve

alternative approaches to environmental controls. Additionally the State may need to look at additional resources to assist in this effort.

The Poultry Industry is essential to the financial wellbeing and future of Missouri. However our relations with other states where excess nutrients from Missouri may be affecting their water quality as well as our own must be addressed.

The committee also believes that while implementation of many of the recommendations will ultimately fall to the growers, and those who utilize the litter from poultry houses, growers and litter users alone should not shoulder the financial burdens of these recommendations. Other beneficiaries including the State of Missouri must be prepared to provide additional financial resources.

LEGISLATIVE RECOMMENDATIONS:

ON FARM OPERATIONS

- Continue to allow and support land application of poultry litter consistent with sound nutrient management and water quality standards.
- Promote the use of nutrient management planning because it offers the best framework for utilizing litter nutrients in an effective and efficient way.
- Promote better timing of manure applications through:
 1. Education of farmers and contract manure applicators.
 2. Financial incentives for stack houses.
- Provide farmers the option of using a 35-foot permanently vegetated application setback as an alternative to the 100-foot application setback from surface waters as implemented in the revised USEPA regulations for concentrated animal feeding operations.

RESEARCH

- Support continued data capture to allow optimum economic and environmental utilization of poultry manure and litter. A combination of state, federal and private funds will be needed to gather this information.
- Provide support to the Departments of Natural Resources, Agriculture and Transportation to develop and coordinate geographic information system data bases such as density of poultry growers, road and rail systems, power plants, waterways, etcetera to allow as high a level of accuracy and planning flexibility as possible as alternative solutions to excess poultry litter are formulated and implemented. Federal privacy requirements will be followed.

POLICY

- Support the certification of nutrient planners through voluntary programs such as those developed by the NRCS and other agencies rather than developing a new mandatory program.
- Review, and if necessary amend, existing statutes and rules regarding handling of animal manures, poultry litter and fertilizer to avoid or remove unintended barriers to beneficial uses of raw or processed poultry litter.
- The legislature should encourage development of partnerships to develop alternative uses of poultry litter so that risks of adopting new technologies and financial investment burdens can be borne by all potential beneficiaries including growers, integrators, local/state/federal government, utilities/rural electric cooperatives, tourists and the general population.

INCENTIVES

- Provide support to an array of technologies and management techniques that provide beneficial uses for poultry litter and are affordable. No single technology or technique can best serve every poultry grower.

Composting of raw manure with sawdust to provide a high value horticultural product should be the subject of further demonstration as a management technique. Two technologies that are currently ready for further demonstration are an on-farm litter burning furnace and a biomass compaction technology that requires support so that a commercial prototype can be built and tested. Care must be taken to provide incentives without creating permanent subsidies.

- The legislature should provide incentives for development of transportation, handling and storage infrastructure for poultry litter. These incentives should not be permanent subsidy programs and should not inhibit development or demonstration of any other beneficial uses for poultry litter.
- Implement a tax credit, similar to the Wood Energy Tax Credit, to create an incentive to growers or companies to make capital equipment and other infrastructure investments needed to develop beneficial uses for poultry litter. Again, this should be structured to be an incentive rather than an ongoing permanent subsidy.
- The legislature should encourage existing programs such as Missouri Enterprise and the Agriculture and Small Business Development Authority to provide support to appropriate parties, be they growers, developers or manufacturers in research into and development of new business plans. New entities will need to be created to develop infrastructure for implementing innovative uses of poultry litter.
- Low-cost financing or grants should be made available to benefit poultry growers to allow the purchase of new equipment, investment in new cooperatives or other business entities, or implementation of new management techniques that result in environmentally beneficial use of poultry litter.

RECOMMENDATIONS TO NON-LEGISLATIVE AGENCIES

Through creation of the Missouri Poultry Industry Committee the legislature has initiated a positive discussion among the many organizations actively involved in this valuable Missouri Industry. The committee has developed recommendations directed at some additional entities.

- Transportation firms should participate in studies to identify means of overcoming barriers to use of backhaul grain transport vessels for transport of raw and processed poultry litter or litter ash products.

- Poultry industry work with the fertilizer industry to encourage and embrace the use of local poultry manure as a source of nutrients to benefit the state economy.
- The feed industry should work to develop low phosphorous corn and other means to reduce the amount of phosphorous passing through the birds. Research institutions should identify such projects as high priority.
- Growers should take advantage of technical support and financial incentives available through USDA agencies and local soil and water conservation districts to make use of filter strip and riparian forest buffer practices to reduce the delivery of excess nutrients to Missouri streams.
- USDA should review their requirements to assure that removal of plant materials within buffer zones is allowed in instances where such periodic removal will result in better reduction of excess nutrient loading in streams. This might impact practice specifications in special programs such as CRP or Wetlands Reserve.

REPORT OF THE
POULTRY INDUSTRY VIABILITY SUBCOMMITTEE

IMPACT OF POULTRY ON MISSOURI'S ECONOMY

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This paper presents the results of a study of the poultry industry in Missouri, conducted at the request of John Bryan of The Poultry Federation. The paper consists of two parts. The first part uses USDA data to draw a comparison between the poultry industry in Missouri and the state's livestock industry. The second part uses survey data to assess the impact of the poultry industry on Missouri's economy.

Table 1 shows 2002 Missouri marketings of poultry and livestock in both numbers of animals and cash receipts. In 2002, Missouri poultry sales generated \$700 million of cash farm receipts. This was greater than every other livestock category except cattle.

Tables 2 and 3 show how Missouri livestock and poultry marketings have changed since 1970. Annual production numbers for cattle, sheep and milk have been declining. Hogs have increased 13.1% from their 1970 level. Eggs, turkeys and broilers have increased 18.5%, 188.7% and 888.4%, respectively.

Table 4 gives an estimate of how much labor is required to care for the state's livestock herd and poultry flock. The equivalent of nearly 2,600 full-time jobs are required to care for Missouri's poultry flock.

Table 5 gives 2002 data on Missouri marketings and slaughter of cattle, calves, hogs, young chickens and young turkeys. The state slaughters less than 5% of its annual marketing of cattle and calves, only about half of its hog production, but kills more

turkeys and chickens than it produces. This huge kill of broilers and turkeys and the accompanying further processing of poultry products have an enormous impact on the state in terms of jobs and income. Table 6 gives an estimate of Missouri jobs produced as a result of the state's slaughter of livestock and poultry.

The final table in the paper presents the results of a survey of the Missouri poultry industry taken in early 2002. Survey forms were returned from poultry firms doing business in Missouri. These firms fall into 5 categories: 13 are poultry and egg further processors, 7 are broiler or turkey integrators, 10 are egg processors, independent hatcheries, or independent pullet growers.

Several assumptions underlie the results reported in Table 7. First, it is assumed the responses given by these 30 firms are complete and accurate. Second, it is assumed that the employees live and shop in the same general area where they are employed, i.e., in Missouri. Third, it is assumed the expenditures of the employees of these firms are similar to those of other Missourians with comparable incomes.

Poultry is very important to Missouri. The 13,635 direct jobs it creates, the 20,453 poultry related jobs it spins off, and the \$92 million in state and local taxes paid annually are a vital part of the state's economy.

Table 1
Missouri Poultry and Livestock Marketings, 2002

<u>Item</u>	<u>Unit</u>	<u>Number marketed</u>	<u>Cash receipts</u>	<u>% of total</u>
Cattle and calves	Head	2,003,000	\$1,044,789,000	40.04
Hogs and pigs	Head	7,726,000	\$ 591,170,000	22.65
Poultry			\$ 699,872,000	26.82
Broilers	Head	240,000,000	\$ 356,400,000	13.66
Turkeys	Head	23,000,000	\$ 272,228,000	10.43
Eggs	Dozen	134,500,000	\$ 69,940,000	2.68
Mature chickens	Head	5,797,000	\$ 1,304,000	0.05
Milk	Cwt.	22,290,000	\$ 269,709,000	10.34
Sheep and lambs	Head	66,800	\$ 4,037,000	0.15
Total			\$2,609,577,000	100.00

Table 2
Missouri Poultry and Livestock Marketings (Quantity)

<u>Year</u>	<u>Cattle and calves</u>	<u>Hogs and pigs</u>	<u>Sheep and lambs</u>	<u>Milk</u>
	(head)	(head)	(head)	(cwt.)
1970	2,249,000	6,830,000	179,000	30,120,000
1975	2,722,000	5,222,000	134,000	30,210,000
1980	2,076,000	7,345,000	67,000	28,260,000
1985	1,980,000	5,683,000	103,100	28,700,000
1990	1,785,000	4,485,000	97,900	29,850,000
1995	1,947,000	6,944,000	79,100	26,450,000
2000	2,003,000	7,726,000	66,800	22,290,000
	<u>Broilers</u>	<u>Turkeys</u>	<u>Mature chickens</u>	<u>Eggs</u>
	(head)	(head)	(head)	(doz.)
1970	24,282,000	7,967,000	7,445,000	113,500,000
1975	23,369,000	8,125,000	5,716,000	103,417,000
1980	23,561,000	12,400,000	5,400,000	121,667,000
1985	31,000,000	12,500,000	5,000,000	112,583,000
1990	88,200,000	18,000,000	4,000,000	131,667,000
1995	190,600,000	21,000,000	4,250,000	142,083,333
2000	240,000,000	23,000,000	5,797,000	134,500,000

Table 3
Missouri Poultry and Livestock Marketings as Percent of 1970

<u>Year</u>	<u>Cattle and calves</u>	<u>Hogs and pigs</u>	<u>Sheep and lambs</u>	<u>Milk</u>
1970	100.00%	100.00%	100.00%	100.00%
1975	121.03	76.46	74.86	100.30
1980	92.31	107.54	37.43	93.82
1985	88.04	83.21	57.60	95.29
1990	79.37	65.67	54.69	99.10
1995	81.24	103.69	39.16	89.44
2000	89.06	113.12	37.32	73.24

	<u>Broilers</u>	<u>Turkeys</u>	<u>Mature chickens</u>	<u>Eggs</u>
1970	100.00%	100.00%	100.00%	100.00%
1975	96.24	101.98	76.78	91.12
1980	97.03	155.64	72.53	107.20
1985	127.67	156.90	67.16	99.19
1990	363.23	225.93	53.73	116.01
1995	784.94	282.41	57.09	125.18
2000	988.39	288.69	77.86	118.50

Table 4
Direct Jobs Caring for Missouri Poultry and Livestock, 2002

<u>Unit</u>	<u>Cattle and calves</u>	<u>Hogs and pigs</u>	<u>Sheep and lambs</u>	<u>Milk</u>
	(head)	(head)	(head)	(cwt.)
Number marketed	2,003,000	7,726,000	66,800	22,290,000
Hours per unit	14	2.1	4	0.4
Total hours	28,042,000	16,224,600	267,200	8,916,000
Full-time jobs	14,021	8,112	134	4,458

	<u>Broilers</u>	<u>Turkeys</u>	<u>Mature chickens</u>	<u>Eggs</u>
	(head)	(head)	(head)	(doz.)
Number marketed	240,000,000	23,000,000	5,797,000	134,500,000
Hours per unit	0.008	0.045	0.04	0.01
Total hours	1,920,000	1,035,000	231,880	1,345,000
Full-time jobs	960	517	116	673

Table 5
Missouri Poultry and Livestock Slaughter, 2002

		Number marketed	Number slaughtered	Percent of marketings
Cattle & calves	Head	2,003,000	87,000	4.34
Hogs	Head	7,726,000	3,839,900	49.70
Young chickens	Birds	240,000,000	358,927,000	149.55
Young turkeys	Birds	23,000,000	25,290,000	109.96

Table 6
Direct Jobs Slaughtering Missouri
Poultry and Livestock, 2002

	Cattle and calves (head)	Hogs and pigs (head)	Sheep and lambs (head)
Number slaughtered	87,000	3,839,900	n/a
Hours per animal	1.25	0.85	
Total hours	108,750	3,263,915	
Full-time jobs	54	1,632	

	Broilers (head)	Turkeys (head)	Mature chickens (head)
Number slaughtered	358,927,000	25,290,000	n/a
Hours per animal	0.04	0.14	
Total hours	14,357,080	3,540,600	
Full-time jobs	7,179	1,770	

Table 7
Missouri Poultry Federation Economic Impact Study -- 2002

	Poultry & Egg Further Processors	Broiler/ Turkey Integrators	Others	TOTAL
Number of Firms	13	7	10	30
Direct Jobs	3,045	9,584	1,006	13,635
Times Multiplier	1.5	1.5	1.5	1.5
Spinoff Jobs	4,567	14,376	1,509	20,453
Total Local Jobs	7,612	23,960	2,515	34,088
Times Multiplier	1.23	1.23	1.23	1.23
# Unemp Family Members	9,363	29,471	3,093	41,928
Total Population Impact	16,976	53,431	5,608	76,015
Direct Payroll	\$61,942,018	\$195,526,998	\$20,270,795	\$277,739,811
Times Multiplier	1.5	1.5	1.5	1.5
Spinoff Payroll	\$92,913,027	\$293,290,497	\$30,406,193	\$416,609,717
Total Local Payroll	\$154,855,045	\$488,817,495	\$50,676,988	\$694,349,528
Retail Sales/Capita	\$6,248	\$6,248	\$6,248	\$6,248
Total Retail Sales	\$106,065,267	\$333,835,638	\$35,041,596	\$474,942,501
Local Sales Tax Rate	0.02	0.02	0.02	0.02
Local Sales Tax	\$2,121,305	\$6,676,713	\$700,832	\$9,498,850
Average Home Value	\$76,100	\$76,100	\$76,100	\$76,100
Assessment Rate	0.19	0.19	0.19	0.19
Millage Rate	0.04	0.04	0.04	0.04
Property Tax/Home	578.4	578.4	578.4	578.4
Residential Prop Tax	\$4,402,766	\$13,857,506	\$1,454,575	\$19,714,847
Total Commercial Value	\$385,041,194	\$703,090,744	\$106,049,338	\$1,194,181,275
Assessment Rate	0.32	0.32	0.32	0.32
Assessed Value	\$123,213,182	\$224,989,038	\$33,935,788	\$382,138,008
Millage Rate	0.04	0.04	0.04	0.04
Commercial Property Tax	\$4,928,527	\$8,999,562	\$1,357,432	\$15,285,520
State Sales Tax Rate	0.04225	0.04225	0.04225	0.04225
State Sales Tax	\$4,481,258	\$14,104,556	\$1,480,507	\$20,066,321
State Income Tax Rate	0.04	0.04	0.04	0.04
State Income Tax	\$6,194,202	\$19,552,700	\$2,027,080	\$27,773,981
Local Tax	\$11,452,598	\$29,533,780	\$3,512,839	\$44,499,217
State Tax	\$10,675,459	\$33,657,256	\$3,507,587	\$47,840,302

Total Tax	\$22,128,057	\$63,191,035	\$7,020,426	\$92,339,519
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REPORT OF THE
ENVIRONMENTAL IMPACT SUBCOMMITTEE

The charge of this committee was to recommend policy changes to address water quality issues from poultry litter in Southwest Missouri. Our approach was to identify strategies that have potential to improve water quality and then comment on their ability to improve water quality and some of the policy options and issues associated with that strategy.

The topic addressed to date by the committee was *Phosphorus and Water Quality*. Other potential topics under consideration are *Nitrogen and Air and Water Quality*, *Fecal Coliform and other Microbial Water Quality Issues* and *Air and Water Quality Issues Associated with Incineration of Poultry Litter*.

PHOSPHORUS AND WATER QUALITY

Executive Summary

- Phosphorus water quality issues are fundamentally watershed and regional issues; many field and farm specific strategies will fail unless they address their impact on the larger watershed and region.
- The most effective strategies for reducing phosphorus losses from agricultural fields are *unilateral* strategies that reduce phosphorus movement from the field or farm without transferring the burden of water quality management to another location. Examples of unilateral strategies include: *i.* land treatments such as vegetative buffers that remove soil particles and nutrients from surface water runoff; and *ii.* management practices that promote application during periods of the year when manure has time to react with the soil before runoff events occur.
- Success of transport strategies that promote export of manure from the field, farm or watershed are dependent on the effectiveness of water quality management on the fields importing manure.
- Transfer strategies often rely on displacing fertilizer phosphorus applications with manure applications to attain water quality goals. Incentives promoting replacement of fertilizer with manure have potential negative economic impacts on the fertilizer industry. Added regulations on farmers importing manure will make manure less competitive with commercial fertilizers. Any efforts to address export of manure must consider these conflicts.
- Most regulations and incentives focus on improving management on operations generating manure but do not provide incentives for farmers importing manure to improve management strategies.

Specific recommendations

The committee supports legislative action to implement the following 4 recommendations.

- Promote better timing of manure applications through:
 3. Education of farmers and contract manure applicators.
 4. Providing incentives for stack houses.
- Provide farmers the option of using a 35-foot permanently vegetated application setback as an alternative to the 100-foot application setback from surface waters as implemented in the revised USEPA regulations for concentrated animal feeding operations.
- Promote the use of nutrient management planning because it offers the best framework for utilizing litter nutrients in an effective and efficient way.
- Support voluntary, not mandatory certification of nutrient management planners.

The full list of strategies considered by the committee and their recommendations on the merits of each is included in the full report that follows.

Background Information

Strategies to reduce phosphorus loss can be divided into 2 categories. *Unilateral* strategies reduce phosphorus loss from a field or farm without transferring the burden of water quality management to other locations. Examples of unilateral strategies include land treatment practices that reduce phosphorus loss from a field or improved manure application timing that prevents runoff before the applied phosphorus has reacted with the soil. These are the most desirable strategies because they reduce phosphorus loss to a waterbody with no potential negative effect in another area.

The second category is *transfer* strategies where benefits are obtained by moving manure to other locations. Transfer likely improves water quality on manure losing fields by reducing phosphorus loading. But the net improvement to water quality on the farm, watershed or regional scale is dependent on how it is managed on the receiving fields. Utilization of exported litter to replace chemical fertilizer applications or enhance crop removal of nutrients from a site for commercial benefit has potential to be water quality neutral on the receiving fields. Transfer to more marginal fields with more marginal timing and/or with limited demand for the applied nutrients may create a net increase in phosphorus loss.

Current regulations

Recent changes in the USEPA Concentrated Animal Feeding Operation (CAFO) regulations under the Clean Water Act have added requirements for permitted operations to assess both phosphorus and nitrogen loss potential from fields and manage manure based on phosphorus considerations when indicators of phosphorus loss are high. We are currently in the period where Missouri Department of Natural Resources (MDNR) is formulating the changes needed in Missouri regulations to meet the revised Federal requirements and the areas where state legislative action is needed to meet the requirements of the new rules. The CAFOs regulations addresses farm-specific manure management concerns on larger operations. The revised rules will affect most permitted operations when the new General Permit is developed; the current General Permit will expire in February 2006.

The target of current CAFO water quality regulations are large manure producing operations (operations with at least 1000 animal units). The regulations have the potential to promote both unilateral and transfer strategies on these operations. The effectiveness of manure regulation is further constrained by competition with commercial fertilizers as a nutrient source for crops. Manure has some liabilities as a fertilizer source that reduces the value of manure nutrients compared to chemical fertilizer sources in most markets. Further restrictions and requirements for farmers receiving manure will further erode manure value and its competitiveness with commercial fertilizers. We must also acknowledge that transfer strategies specifically aim to replace commercial fertilizer sales with manure applications.

In short, current state livestock waste management regulations will soon be revised to meet new federal standards, and several revised water quality standards are not far behind. These regulations provide partial solutions to water quality problems in watersheds with multiple sources of impairment.

Voluntary efforts

The number of voluntary efforts to improve water quality through improved manure management are extensive and beyond the ability of this summary to fully quantify. Voluntary efforts include efforts by integrators and lenders to encourage their growers to implement nutrient management plans. They include voluntary components of the Total Maximum Daily Load (TMDL) plans being adopted by some watersheds. They include many incentive programs for land treatment and other nutrient management activities through USDA, MDNR 319 program, Natural Resources Conservation Service, Soil and Water Conservation District boards and other agencies. Voluntary efforts also include educational efforts by University Extension, watershed groups, farmer groups and integrators to help farmers and other residents understand water quality challenges and their solutions.

The strength of these efforts is that they tend to address all sizes of operations and many, such as the TMDL process attempt to address whole watershed solutions. A weakness of many efforts is they still focus primarily on incentives for manure producers without addressing those utilizing the manure for a nutrient resources. For example, the EQIP score sheets of 2003 strongly favored incentives for operations generating manure who adopted nutrient management but did not provide any competitive advantage to farmers accepting manure for use as a fertilizer on their farm.

Management Strategies

The following table identifies specific strategies for reducing phosphorus loss and defines the strategy as a unilateral or transfer strategy (see definitions above). There is a short summary of the potential water quality impact and the policy options and issues that may be raised by the strategy. This is not meant to be an endorsement or exhaustive summary of all aspects of each strategy. Rather our objective was to highlight the key concepts that would require further analysis if policy makers choose to further promote a specific strategy.

Environmental Issue: Phosphorus and Water Quality		
Strategy	Water quality impact	Public policy options and issues
1. Timing of manure applications (unilateral strategy)	Runoff events after surface application of manure can result in high concentrations of soluble phosphorus in runoff. The likelihood of such losses is determined by the degree that manure has reacted with the soil before a runoff event occurs. <ul style="list-style-type: none"> Improving timing of manure application is a very effective strategy to improve water quality. It provides direct reductions in phosphorus load without promoting additional losses at another location. Management strategies should be crafted to limit surface applications of manure and other phosphorus fertilizers under conditions when runoff is likely to occur before the surface-applied phosphorus has reacted with the soil. 	Conditions that promote high soluble phosphorus losses after manure application include surface application to saturated or frozen soils and application during periods of the year when runoff is likely. Policy options that promote improved timing of manure applications include: <ul style="list-style-type: none"> Promoting the building of stack houses that allow farmers to store manure so application time is not determined by clean out date of the building. Promote nutrient management planning for all nutrient applications because such planning considers timing of application as a component of the plan. Promote education of contract applicators so they recognize conditions when runoff soon after application is likely. Promoting education on the benefits of late summer and early fall applications in forage systems.
2. Land treatment and setbacks (unilateral strategy)	Setbacks and land treatments that control erosion and filter runoff leaving the edge of the field are well-documented strategies to improve water quality. <ul style="list-style-type: none"> Water quality will increase particularly on fields that currently have high erosion rates. This is a very effective unilateral strategy that leads to immediate reductions in phosphorus loss without increasing potential for increased losses at another location. 	There are already many incentives at the state and federal level to promote land treatment practices to reduce erosion. Policy opportunities include: <ul style="list-style-type: none"> Adoption of reduced setback requirements when farmers use permanent vegetated filter strips with potential for periodic removal of biosolids. Permanent vegetated filter strips that do not receive manure are at least as effective as cropped application setbacks and the benefits are maximized with a narrower setback.

Environmental Issue: Phosphorus and Water Quality (continued)		
Strategy	Water quality impact	Public policy options and issues
3. Reduce phosphorus through feed management (unilateral strategy)	Strategies that allow growers to reduce the phosphorus fed the birds such as feeding the enzyme phytase and reducing excess phosphorus fed the birds reduces the amount of phosphorus in the manure. <ul style="list-style-type: none"> This is an effective water quality strategy for reducing the amount of phosphorus entering the watershed, unilaterally reducing the amount of phosphorus land applied. 	Diets are typically controlled by the integrator so individual farmers have little control over phosphorus levels in feed. An effective manure testing program provides insight into the dietary levels of phosphorus being fed.
4. Chemical treatment of manure to reduce phosphorus availability (unilateral strategy)	Net effect on watershed should be positive or neutral. Treatments such as alum convert highly soluble phosphorus in manure to an insoluble compound. <ul style="list-style-type: none"> Water quality benefits by eliminating the potential for large losses of soluble phosphorus in runoff events that can occur soon after manure application. The additive also reduces the effectiveness of the litter for raising soil test phosphorus further reducing soluble phosphorus losses from the field. These losses are of particular importance on fields such as pastures that have low erosion rates. Chemical treatments do not reduce the amount of phosphorus lost through erosion of soil particles. Chemical treatments will have little impact on phosphorus loss from fields with high erosion. 	Public policy opportunities include a focus on promoting the use of chemical additives in poultry houses and on research further defining the effectiveness of the strategy. <ul style="list-style-type: none"> Additives such as alum have other positive effects when used in poultry houses including lower ammonia volatilization, improved bird health and reduced energy costs. Education on the benefits and efforts to help grower and integrator to share in the costs and benefits of the practice would promote adoption. The long-term fate of bound P, particularly in river and lake sediments is not fully understood and would benefit from additional research.
5. Use of poultry litter as a bio-energy source (transfer strategy)	The water quality benefit of this strategy is based on the fate of the ash, which contains all the phosphorus in the litter. Burning litter concentrates the phosphorus from ~3% phosphate to over 20% phosphate although the availability of the phosphorus decreases from 100 to 50%. No phosphorus is lost through combustion. <ul style="list-style-type: none"> Water quality will increase if combustion or gasification and resulting concentration of litter phosphorus promotes transport to areas where it replaces other fertilizer sources. 	Policy options to promote water quality should focus on facilitating the transport of the ash phosphorus and appropriate land application strategies. <ul style="list-style-type: none"> Promote integration of litter ash into fertilizer or other value-added products. Provide cost effective uses of the energy content of the litter resource. Potential liabilities of this strategy include air quality issues associated with the burner and heavy metal concerns.

Environmental Issue: Phosphorus and Water Quality (continued)		
Strategy	Water quality impact	Public policy options and issues
6. Export poultry manure from the farm for redistribution in the watershed. (transfer strategy)	Net effect on the watershed could be neutral, positive or negative. <ul style="list-style-type: none"> Possible on-farm improvement in water quality through lower potential for over-application of nutrients because of a reduction in the quantity of manure managed on-farm. Off-farm effect determined by the land that receives the manure. Exports may or may not push manure onto land that would not otherwise receive nutrients may reduce water quality. Exports to agricultural land to replace fertilizer and/or be removed by harvested crops would be neutral or beneficial to water quality. 	The existing revised CAFO rule and the NRCS nutrient management standard promote export of manure from high phosphorus fields and farms. New public policy options to enhance water quality should focus on encouraging nutrient management on fields and farms receiving exported manure in addition to those generating manure . Potential examples include: <ul style="list-style-type: none"> Structuring incentive-based programs to encourage cost-share for manure utilization and nutrient management planning on farms that import manure. Policies should be structured to provide incentives for partnering with existing fertilizer industries..
7. Export litter from the watershed (transfer strategy)	Net effect on watershed should be positive. <ul style="list-style-type: none"> Exporting manure should reduce phosphorus loading and promote better management of the manure remaining in the watershed. Water quality effect in receiving watershed should be neutral if manure replaces other nutrient resources such as commercial fertilizer and feed nutrients or if crop removal of nutrients is enhanced. 	New public policy options to enhance water quality should focus on facilitating the transfer of manure out of impaired watersheds to regions that have a high demand for the fertilizer value of manure. They should also promote nutrient management on fields and farms receiving exported manure. Potential opportunities include: <ul style="list-style-type: none"> Market development for manure in receiving watersheds. Existing MDNR project creating a website facilitating litter exchange is an initial step in SW Missouri. A cost-share incentive to transport manure to locations where it is utilized within a nutrient management plan. Infrastructure incentives to promote transport capacity of manure and integration of manure into the commercial fertilizer industry.
8. Composting (transfer strategy)	The water quality benefit of this strategy is based on the improved utilization of the litter because of the changes in litter characteristics due to composting. <ul style="list-style-type: none"> Water quality will increase if composting litter and the subsequent reduction in mass, increase in phosphorus concentration and reduction in odor results in more transport of litter to areas where it replaces other fertilizer sources or enhances crop removal of nutrients. 	Policy options that promote transport of manure will promote composting if the changes in manure characteristics caused by composting are viewed as beneficial to its salability. Potential liabilities of this strategy include that the composting process increases nitrogen loss to the atmosphere as ammonia during the composting process and reduces the nitrogen value of the litter.

Environmental Issue: Phosphorus and Water Quality (continued)		
Strategy	Water quality impact	Public policy options and issues
9. Certification of nutrient management planners (both unilateral and transfer elements)	Nutrient management is a key element of the strategy to improve water quality. Development of a nutrient management plan helps educate the farmer about water quality issues on their farm and provides strategies for the farmer to address those issues.	Certification of nutrient management planners is a concept where the devil is in the details. We recommend existing certification efforts (e.g. NRCS) and a voluntary certification standard. The NRCS certification is a national self-certification program that has no local requirements. Benefits of a certification program include: <ul style="list-style-type: none"> • A mechanism to address individuals who consistently write or approve substandard plans (voluntary certification would not address this point). • A mechanism to review plans for permitted operations before it is a regulatory violation issue.
10. Certification of professional manure applicators (contract haulers) (primarily a unilateral strategy)	This strategy would improve water quality if training and certification of individuals responsible for applying manure would improve their ability to recognize and avoid applications in situations where phosphorus runoff is likely.	Implementation issues are similar to certification of nutrient management planners (above). An education effort has inherent value for applicators. The greatest policy issues are raised by requiring applicators to insure that applications of manure are properly timed and compliant with a nutrient management plan. This shifts the role of the applicator from a service provider to a regulator of the manure producer.

THE REPORT OF THE
LITTER ISSUES SUBCOMMITTEE

Litter Issues Subcommittee Report
to the
Missouri Poultry Industry Committee

Issue: What can be done with poultry litter that will not cause environmental harm and that will be affordable and technically practical for growers?

Background: Confinement poultry growing has been a component of Missouri agriculture for over fifty years. Presently, the main elements of this industry are described as turkeys, grown for their meat; broilers, chickens grown for their meat; and layers, chickens that produce our eggs.

Since the early 1970's growth in this industry has been quite rapid, with broiler production growing almost nine-fold. In 2002 the poultry industry in Missouri provided direct employment to 13,635 persons and created 20,453 additional jobs in related industries. The industry also paid \$92 million in state and local taxes in 2002.

During this period poultry manure and litter (a mix of bedding materials such as sawdust or rice hulls and manure) have been used extensively as plant nutrients, mainly on local pastures. Since many of these soil types, especially in southwest Missouri were originally deficient in many minerals this locally available and relatively inexpensive fertilizer source was a boon to the local cattle industry.

As land application of poultry litter expanded with the growth of the confined poultry industry concern was raised about potential runoff of nitrogen (N), as this was the most mobile nutrient in the litter. Application rates for litter were developed based on plant uptake of N. Only recently has another nutrient, phosphorous (P), come under scrutiny as the ability of some local soils to absorb and hold this nutrient has been saturated.

Excess P once transported to lakes and streams causes algal blooms which in turn reduce oxygen in these water bodies and degrade fishing and other recreational experiences. In some cases this can also increase the cost of drinking water treatment. For these reasons action needs to be taken to assure that the success of the poultry industry does not endanger the quality of other industries in our state. The Litter Issues Subcommittee has been charged with considering potential means by which this balance between poultry raising, environmental quality and recreation may be achieved.

Discussion of Poultry Manure and Litter and Potential Uses: This committee feels the poultry industry can continue to function as a major contributor to Missouri agriculture, but agrees that new uses must be found for poultry litter in order to avoid unnecessary harm to our State's natural resources and other industries. Depending on the type of poultry production urine and droppings from the birds are captured in significantly different forms. The form of these droppings impacts the uses to which they can be applied.

Laying hens have traditionally been kept in houses where their droppings are scraped out in a very moist form that is sent to lagoons for digestion and subsequently spread either through irrigation systems or by injection. Many new layer houses are being built using what is called a

high-rise house design. In these houses the cages are located on an upper floor so that droppings fall into a basement area where bedding materials have been spread. This allows the droppings to dry avoiding lagoon management issues and allowing the resulting litter to be applied to fields at optimal times.

Turkey growers start the small birds in brooder houses. These houses have a layer of bedding material, usually hardwood sawdust in Missouri, and the birds are kept in the brooder house for about six to eight weeks, until the birds weigh approximately five to six pounds. Because the birds are small and stay in the brooder house only a short period litter from these houses is used to supplement the bedding in the grow-out house where the turkeys are raised to slaughter weight. Fresh bedding is then spread in the brooder house. In the grow-out houses rather than removing all bedding and droppings the top layer, or cake, is removed from the house floor. This cake contains relatively little bedding material and mostly dried droppings.

Broilers, or chickens raised for their meat, are brooded and grown out in the same building. A bedding material, again usually hardwood sawdust in Missouri, is laid out and absorbs the chicken droppings. When these houses are cleaned out the litter, the mixture of droppings and bedding material, is removed and new bedding is spread.

Due to the fact that in some locales within Missouri litter can no longer be land applied without negative environmental and economic consequences alternative uses of this product must be developed. Simply stated, in some watersheds within the state the P in poultry litter must be transported out to other watersheds where it can be used beneficially. Systems must be developed to allow this to be done in a manner that is affordable for the poultry industry. The committee feels consideration and support should be given to development of at least the following uses for poultry litter.

- Land Application: At this time the main disposal method for poultry litter is land application as a soil amendment/plant nutrient source. On farms where litter can be used in this way without causing harm to surface or subsurface water resources this should certainly continue to be an allowed practice. A Poultry Litter Information Exchange has been initiated on the World Wide Web at www.mo-poultry.org. This site allows interested persons to post either a desire for poultry litter or the availability of poultry litter. Information on its availability is being spread by the Poultry Federation, Extension Service and others. Litter can be land applied in many areas within and outside of Missouri in an environmentally safe manner. The main obstacle to remote land application is the cost of transporting raw litter. Should more, longer-distance transport of litter begin to occur care must be taken to assure bio-security is in place to avoid inadvertent spreading of pathogens.
- Composting: By composting manure and litter from layer, broiler or turkey operations volume is reduced, and odors and pathogens are destroyed. Also, as the volume has been reduced this may make use of compost as a land application material more affordable. In some cases waste materials such as sawdust or non-recyclable waste paper can be used in the composting process allowing a beneficial use for these products. Marketing of finished compost is the major challenge, but not necessarily

an insurmountable one. If large volumes of compost are produced this could lead to interest by larger retail outlets. Other issues to be considered are location and size of compost facilities and initial cost of site construction. If central locations are used by multiple growers biosecurity becomes a major concern.

- Pelletizing: Pelletizing is a process borrowed from the feed industry where litter is forced through a die machine at high pressure producing cylindrical pellets. This process reduces pathogens by creating high pressure and temperature during the formation of the pellets, and also reduces the volume by about 50%. Litter pellets have been used as a soil amendment with good results. In addition to the N, P and potassium (K) value the pellets contain organic carbon and a host of trace minerals that improve plant growth. Challenges to the pellet industry include transportation distance to the pellet mill from the poultry houses and to the cropping area markets, cost of drying the litter prior to pelletization and the initial cost of the facility.
- Use as Fuel: Broiler house litter, turkey brooder house litter, and possibly turkey grow-out house litter if it contains sufficient bedding material, contains sufficient energy content to be used as a fuel. Energy content is measured in British thermal units or Btu. Three large electric generation facilities, in the 10 to 25 megawatts (MW) size range, are in operation in the United Kingdom and were built and are operated by the Fibrowatt Group. A 50 MW facility that is being proposed for construction in Benson, Minnesota will use a combination of turkey litter and other biomass fuels. This project is dependent on receiving federal green energy electricity credits of about 1.8 cents per kilowatt-hour and other financial support. Also, such plants are best sited in the midst of the existing fuel supply. Some companies are also developing smaller systems to produce heat for commercial and industrial applications.

Another option being considered is to use broiler litter on the farm to supplement the heat currently provided by propane or natural gas for keeping the houses up to temperature for good bird growth. Up to this point in time no one has developed an affordable, dependable litter-fueled heater. The Department of Natural Resources (DNR), the Southwest Missouri RC&D Council (SWMO-RC&D), the Environmental Protection Agency (EPA) and the Department of Energy (DOE) are currently developing a demonstration project to test such an on-farm litter-fueled heater to see if it proves viable for poultry growers. Calculations suggest that the Btu content of the litter produced in a broiler house each year is very close to the house's energy needs for a year. With increasing costs of propane and natural gas the ability to farm grown fuel to offset a portion of those costs could mean the difference between profit and loss for these growers.

Use of litter as a fuel will create ash. This ash will contain the P and K that was in the litter as well as other minerals including calcium, boron, arsenic and others. The ash should prove to be a valuable product in its own right. Tests are being done on this ash to identify any potential issues regarding its use as a fertilizer or animal feed ingredient. Initial estimates suggest a retail value of the P and K alone to be \$95 per

ton. If a grower realizes just half of this value this product will help pay for an on-farm heater. If ash were produced at a large energy facility it would again be a valuable co-product.

Issues from Related Industries: In order to best address the opportunities presented by the amount of poultry co-products being produced coordination with related industries is essential. Also, in some cases federal or state policy assistance may be needed to allow optimal solutions to be implemented. Some issues seen as critical to successful solution development include the following.

While the poultry industry has been growing at a rapid rate since the 1970s it is now a mature industry and no significant growth in the number of growers or birds is expected in the future. This is important because the scope of issues such as excess P from the poultry industry can be quantified and will not soon be obsolete. This also brings to fore the equally important need to quantify competing sources of P loading to the State's waters. Such sources include septic systems, beef and dairy cattle, swine, urban lawn and garden and commercial agricultural fertilizers, some industries and wildlife. Basic research is needed to develop some of the needed data. Applied research is needed to develop tools to allow full consideration of the impacts of nutrients from multiple sources in farm and watershed management.

Soil nutrient management is at the core of current concern regarding poultry litter management. The interplay between litter and commercial fertilizers, whether on a single field or in a watershed context needs to be understood and managed. Also, a distinction exists between what can legally be referred to and sold as fertilizer versus items often called soil amendments. The fertilizer industry polices itself to insure quality and consistency in its products. It also pays fees to provide for oversight of these efforts by the State. For reasons of both equity and technical assurance it is essential that the fertilizer industry be intimately involved in discussions of how to safely apply raw and processed litter products. Quite possibly the existing fertilizer industry will serve as a key market for raw and pelletized litter - and litter ash should use of litter as a fuel become widespread.

The Revised Statutes of Missouri deal with certain issues regarding fertilizer distribution and sales (See Appendix A). Unmanipulated animal and vegetable manures are specifically excluded from the definition of fertilizer in the statutes. This exemption predates confined animal production and was intended to allow growers to use their own manure on their own farm without having to deal with any regulations. New water quality management programs at the federal and state levels will likely create restrictions on land application of animal manures regardless of their statutory definition. Fertilizer does include "... any organic or inorganic material of natural or synthetic origin which is added to soil, soil mixtures, or solution to supplement nutrients and is claimed to contain one or more essential plant nutrients." This means that if either litter that has been pelletized, or ash from the burning of litter, is marketed based upon its content of N, P or K then it is fertilizer. Statutory language also identifies anyone who sells, consigns or barter such materials as a "Distributor" of fertilizer who is required to obtain a permit from the Director of the Missouri Agricultural Experiment Station at Columbia, Missouri each year.

Transportation expense is a critical element in developing affordable options for poultry litter use. Over 26,000 train-car loads of corn are imported to southwest Missouri each year and these train cars return to the corn growing regions empty. Likewise, feed trucks deliver feed to poultry growers and return to the feed mill empty. If these return trips carried a load of litter or ash then energy and money could be saved. Also, if litter or P-carrying ash were transported back to the corn growing areas it could be reused where it is needed rather than become an excess nutrient problem in Missouri.

Common wisdom says that containers used to transport litter cannot be used for transporting feed or grain, but this is not in and of itself a true situation. Two areas of regulation actually impact on this issue. One is Standards of Fitness for grain stowage containers. Under the associated Standards for Cleanliness – Insanitary Conditions is stated, “The stowage area must not contain . . . bird excreta, . . .” And, under Standards for Free of Infestation, . . . and Foreign Odor is stated, “The stowage area must not be contaminated with . . . any other commercially objectionable odor.” The second area of regulation deals with Corn Grade Requirements and specifically states that corn with “ . . . animal filth in excess of 0.20 percent in 1,000 grams; or . . . has a . . . commercially objectionable odor . . .” will be relegated to U.S. Sample grade corn, which is the lowest grade given. Rapid loading and unloading of litter or litter products must be developed to optimize the economics of long-haul transportation, and the corrosive nature of raw litter must be addressed.

Furnace manufacturers have tried, unsuccessfully, for many years to develop affordable on-farm poultry house heaters that could use wood or the litter itself as a fuel. Memories of past failures must be overcome through new furnace designs and demonstration of these furnaces. Given the current increases in propane and natural gas prices, and the prediction that these prices will be the norm rather than a temporary increase, the availability of an affordable furnace that could use litter as its fuel would be a great benefit to poultry growers in Missouri. A Missouri company is currently developing such a device and looking for support to demonstrate its product. Other firms have been working on larger scale boilers and generation units that may be able to use poultry litter as a fuel for commercial, industrial and utility applications.

Environmental agencies have responsibilities toward the populace as a whole to protect public health through maintenance and improvement of the quality of our environment. EPA and DNR are developing a Total Maximum Daily Load for a nutrient impairment in the Elk River basin in SW Missouri. The poultry industry is one of the major sources of excess nutrient loading in the watershed. The implementation plan from the TMDL can be used as an additional element for use in a comprehensive Watershed Management Plan. These plans are generated by locally led partnerships of interested stakeholders. The better the input data and alternatives for management provided to the agencies and the public, the better will be the resulting management recommendations. If litter is used as a fuel then data must be gathered to make sure an air quality problem is not created. And, if certain waste materials can be beneficially and safely used as part of pelletizing, composting and/or fuel processes the public must be provided information that explains the safety of these uses. In some situations statute, rule or agency policy may need to be amended to allow newfound beneficial uses for these various resources.

USDA-Natural Resources Conservation Service (NRCS) has responsibility for administering certain filter strip and riparian forest buffer practices implemented by landowners to reduce soil erosion and resultant water pollution. Their existing regulations do allow harvest of grasses grown in these areas, and in situations where excess nutrients are accumulating in these strips the harvest and removal of each year's growth could enhance the benefits of these practices. Growers in all watersheds should consider whether their current operations are making best use of these tools for water quality maintenance and improvement.

In Missouri poultry production is most concentrated in the southwest corner of the state. The tourism industry in that area is heavily dependent on water-based activities to draw visitors to their many attractions. Excess P runoff increases turbidity and algal growth in streams and rivers and detracts from their aesthetic value. Should this areas waters become polluted to the extent that human health issues begin to occur significant economic as well as health problems could occur. Just as leaders in the tourism industry have led efforts in identifying these water quality issues, they can also be valuable partners in developing and assisting in implementation of actions to alleviate this threat to their livelihood and the State's environment.

Recommendations: Missouri is a wonderfully diverse state with a wide range of landscapes, ecosystems, towns and industries. Variety in plants and animals lends resiliency to an ecosystem and variety in industries lends viability to our State's economy. Ecosystems change through time as a bare piece of ground progresses through stages of annual weeds to perennial grasses and trees to mature prairies and forests. In like manner industries and industry mixes must change and adjust as expansion of one industry puts untenable strains on other industries.

The Missouri General Assembly should be proactive in providing support to solution development. Solutions will need to be phased in over a period of time and some will only be appropriate as temporary fixes to be phased out, as more permanent solutions become available. Simply put, the poultry industry can't be closed down and then be expected to return later.

The Missouri Poultry Industry Committee acknowledges that some Missouri waterways are suffering from excess nutrient loading at this time. It also supports actions to help alleviate this situation that will lead to improved economic and ecological viability of the poultry, tourism and related industries in Missouri. To this end we submit the following recommendations to the Missouri legislature.

- Support continued data capture to allow optimum economic and environmental utilization of poultry manure and litter. A combination of state, federal and private funds will be needed to gather this information. Indices should be developed based on valid data to assure that use of raw manure and litter, litter pellets, composted poultry manure and litter, and ash from poultry litter as a fertilizer supplement/soil amendment does not cause environmental harm. Conversely, these indices will provide credibility to proposed farm nutrient management plans and watershed Total Maximum Daily Load values development. The committee does not want to cause new problems while solving existing challenges.

- Continue to allow and support land application of poultry litter in those locations where no environmental degradation is caused.
- Provide support to the Departments of Natural Resources, Agriculture and Transportation to develop and coordinate geographic information system data bases such as location of poultry growers, road and rail systems, power plants, waterways, etcetera to allow as high a level of accuracy and planning flexibility as possible as alternative solutions to excess poultry litter are formulated and implemented. (See Figure 1. Southwest Missouri Cation Exchange Capacity Map, page 10, as an example of the types of materials that can be developed. A high cation exchange capacity is important for soil to be able to absorb and hold elements such as phosphorous and potassium.)
- Provide support to an array of technologies and management techniques that provide beneficial uses for poultry litter and are affordable. No single technology or technique can best serve every poultry grower. Two technologies that are currently ready for further demonstration are an on-farm litter burning furnace and a biomass compaction technology that requires support so that a commercial prototype can be built and tested. Care must be taken to provide incentives without creating permanent subsidies.
- A tax credit, similar to the Wood Energy Tax Credit, should be considered to create an incentive to growers or companies to make capital equipment and other infrastructure investments needed to develop new beneficial uses for poultry litter. Again, this should be structured to be an incentive rather than an ongoing subsidy.
- The legislature should provide incentives for development of transportation, handling and storage infrastructure for poultry litter. These incentives should not be permanent subsidy programs and should not inhibit development or demonstration of any other beneficial uses for poultry litter.
- Review, and if necessary amend, existing statutes and rules regarding handling of animal manures, poultry litter and fertilizer to avoid or remove unintended barriers to new, beneficial uses of raw or processed poultry litter.
- The legislature should encourage development of partnerships to develop alternative uses of poultry litter so that risks of adopting new technologies and financial investment burdens can be borne by all potential beneficiaries including growers, integrators, local/state/federal government, utilities/rural electric cooperatives, tourists and the general population.
- The legislature should encourage existing programs such as Missouri Enterprise and the Agriculture and Small Business Development Authority to provide support to appropriate parties, be they growers, developers or manufacturers in research into and development of new business plans. New entities will need to be created to develop infrastructure for implementing innovative uses of poultry litter.

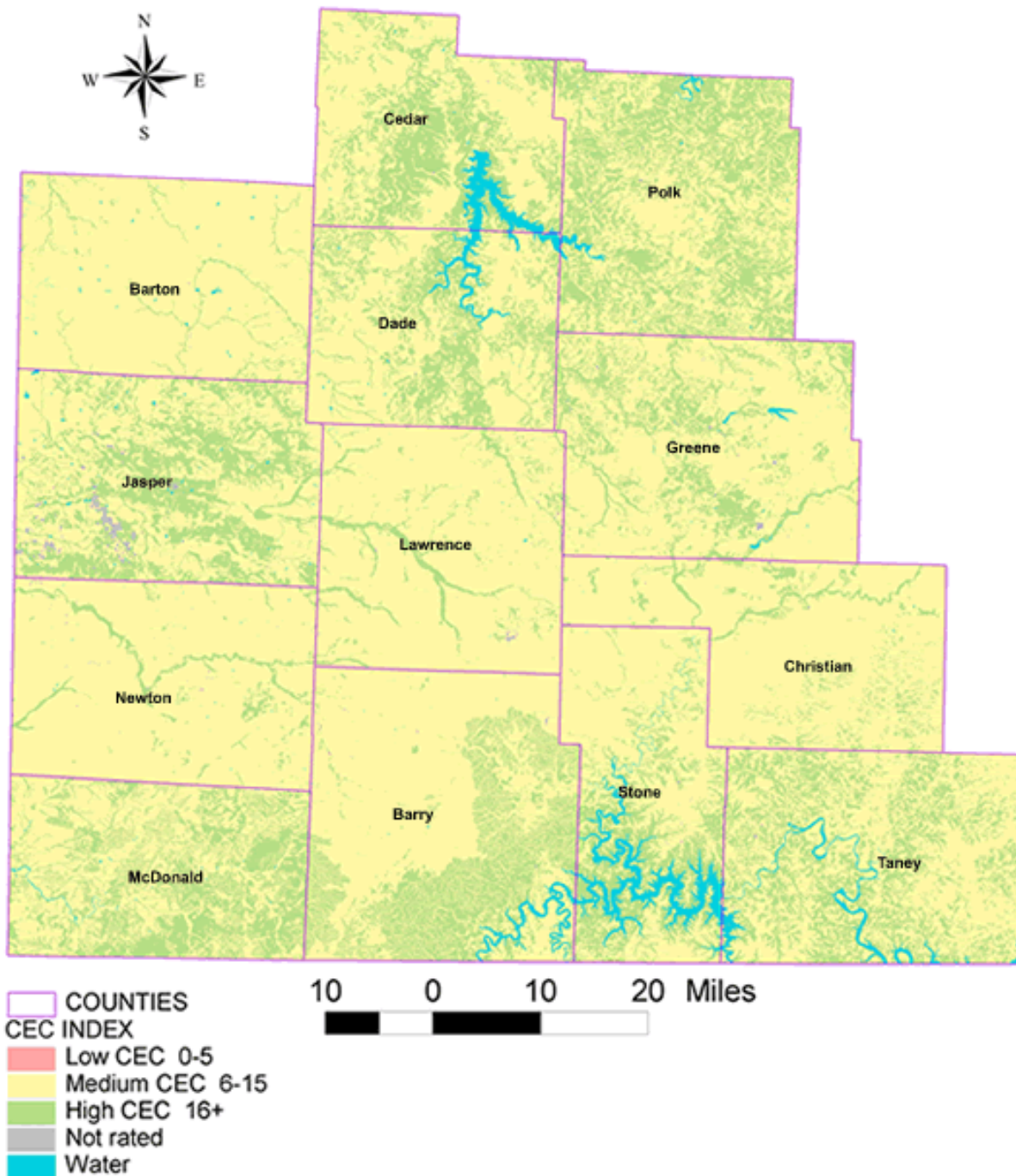
- Low-cost financing or grants should be made available to poultry growers to allow the purchase of new equipment, investment in new cooperatives or other business entities, or implementation of new management techniques that result in environmentally beneficial use of poultry litter.

RECOMMENDATIONS TO GROUPS OTHER THAN THE GENERAL ASSEMBLY

- Transportation firms should participate in studies to identify means of overcoming barriers to use of backhaul grain transport vessels for transport of raw and processed poultry litter or litter ash products.
- Poultry industry should work with the fertilizer industry to optimize use of nutrients and assure consumers that their purchase and application of plant nutrients has sufficient quality control.
- The feed industry should work to develop low phosphorous corn and other means to reduce the amount of phosphorous passing through the birds. Research institutions should identify such projects as high priority.
- Growers should take advantage of technical support and financial incentives available through USDA agencies and local soil and water conservation districts to make use of filter strip and riparian forest buffer practices to reduce the delivery of excess nutrients to Missouri streams.
- USDA should review their practice maintenance requirements to assure that removal of plant materials is allowed in instances where such periodic removal will result in better reduction of excess nutrient loading in streams. This might impact practice specifications in special programs such as CRP or Wetlands Reserve.

Figure 1. Southwest Missouri Cation Exchange Capacity Map

SOUTHWEST MISSOURI CEC MAP



Appendix A
Definitions and selected section from RSMO 266.291-266.351 regarding fertilizer and its sales and distribution

266.291:

(2) "Distributor" means any person who imports, consigns, manufactures, produces or compounds fertilizer, or offers for sale, sells, barter, or otherwise supplies fertilizers for consumption or use in this state; provided that this term shall not apply to any person who purchases fertilizer from a distributor registered under sections 266.291 to 266.351 and which fertilizer has been once sold in compliance with sections 266.291 to 266.351;

(4) "Fertilizer" includes any organic or inorganic material of natural or synthetic origin which is added to soil, soil mixtures, or solution to supplement nutrients and is claimed to contain one or more essential plant nutrients. The term "fertilizer" does not include unmanipulated animal and vegetable manure and agricultural liming materials used to reduce soil acidity;

266.301. Permit required to sell fertilizer-application. - It shall be unlawful for any distributor to sell, offer for sale or expose for sale for consumption or use in this state any fertilizer without first securing a permit from the director. Such permit shall expire on the thirtieth day of June of each year. Application for such permit shall be on forms furnished by the director.

TEXT OF
Senate Concurrent Resolution
SCR47
Relating to the Poultry Industry Committee

SENATE COMMITTEE SUBSTITUTE FOR
SENATE CONCURRENT RESOLUTION NO. 47

Relating to the Poultry Industry Committee.

WHEREAS, the poultry industry is a vital, profitable and important industry in this state; and

WHEREAS, the General Assembly wishes to maintain and enhance the positive economic impacts while making every attempt to eliminate negative aspects of the industry; and

WHEREAS, the poultry industry produces waste products which have significantly impacted the environment of the state; and

WHEREAS, there exists a need for a study of the economic and environmental impact of the poultry industry in the state, especially the impacts this industry has on sensitive environmental areas:

NOW, THEREFORE BE IT RESOLVED, that the members of the Missouri Senate, Ninety-First General Assembly, Second Regular Session, the House of Representatives concurring therein, hereby authorize the creation of a "Poultry Industry Committee" which shall review and evaluate both the economic impact of the poultry industry, waste disposal issues and environmental impacts of this industry, and make recommendations on further action or legislative remedies, if any, to be taken as necessary; and

BE IT FURTHER RESOLVED that such Committee shall be composed of twenty-three members, one member to be a member of the Senate to be appointed by the President Pro Tem of the Senate, one member to be a member of the House of Representatives to be appointed by the Speaker of the House, two county commissioners or their designees, a representative from the Food and Agricultural Policy Research Institute (FAPRI), a representative of the Environmental Protection Agency (EPA), a representative of the Department of Natural Resources, a representative of the United States Department of Agriculture, a representative of the Natural Resources Conservation Services (NRCS), a representative of the university extension system, a representative of the poultry federation, a representative of the Missouri Farmer's Association, a representative of the Farm Bureau, a representative of the Department of Conservation, a representative of the University of Missouri Department of Agriculture, Food, and Natural Resources, a representative of the Southwest Missouri State University Department of Agriculture, a representative of the University of Missouri Commercial Agriculture Program, a member appointed by the Resource Conservation & Development Council, a representative of the Department of Economic Development, a representative of the Department of Agriculture, a representative of the Clean Water Commission, two active poultry farmers, two poultry industry contractors or processors, a person active in the processing/value-added portion of poultry waste, one person from Missouri Farm Credit Services. Each member of the Committee shall serve until December 31, 2003; and

BE IT FURTHER RESOLVED that the Committee may conduct its business by various means but shall meet no less than twice each year as a full Committee; and

BE IT FURTHER RESOLVED that all state agencies shall cooperate with the Committee in carrying out its duties, including allowing access to closed records, provided that the Committee shall not disclose any identifying information contained in such records closed pursuant to statute or general order and any such information in the custody of the Committee shall not be discoverable to the same extent as when in the custody of the parent agency; and

BE IT FURTHER RESOLVED that all members shall serve without compensation; and

BE IT FURTHER RESOLVED that the Office of Administration shall provide funding, administrative support, and staff for the effective operation of the Committee; and

BE IT FURTHER RESOLVED that the Committee shall study problems and solutions, collect information and provide recommendations in a report to the General Assembly before December 31, 2002;

BE IT FURTHER RESOLVED that the Committee shall submit its final report to the General Assembly no later than December 31, 2003; and

BE IT FURTHER RESOLVED that the Poultry Industry Committee shall terminate December 31, 2003; and

BE IT FURTHER RESOLVED that this resolution be sent to the Governor for his approval or rejection pursuant to the Missouri Constitution.

The Value of Recycled Poultry Litter

Missouri Farm Financial Outlook – 2004
Ag Lenders Seminars November-December 2003
University of Missouri - Outreach and Extension

Poultry Litter --- Poultry Litter is not a homogenous product like corn grain. It varies considerably due to management of the poultry production. Litter is primarily non-digested grain, feed additives such as minerals and antibiotics, water, and the bedding material strewn on the floor of turkey and broiler houses. Laying hens are grown in cages with manure dropping into pits and, therefore, layer litter contains only manure. The primary types of litter (bedding material) used in broiler and turkey houses in Missouri are wood shaving and rice hulls.

Poultry litter is unlikely to contain weed seeds that are often problematic with beef or dairy manures when applied to cropland. Continuing efforts by the poultry industries to reduce the use of antibiotics has nearly eliminated use of antibiotics by some growers.

Table 1. Percentage of nutrients and moisture in broiler litter

	Total Nitrogen	Total Phosphate	Total Potash	Moisture
Broiler	0.2-6.8 mean 3.6	1.0-7.3 mean 3.7	0.6-3.9 mean 2.3	3-42 mean 22
Turkey	0.5-4.4 mean 2.6	0.5-6.3 mean 3.2	0.2-3.6 mean 1.9	0-54 mean 26
Layer-Deep Pit	0.4-3.5 mean 2.0	0.8-5.2 mean 2.8	0.6-3.4 mean 1.5	12-69 mean 45

Source: Livestock Manure Characterization Values from the North Carolina Database

Most of the nitrogen in poultry litter is in organic form. The organic nitrogen must be mineralized to be available for crop use. The mineral nitrogen is mostly in ammonia form subject to volatilization if the litter is not incorporated shortly after application. Much of the ammonia is also often lost if the litter is composted or pelleted. The ammonia is also one source of odor associated with poultry litter. Chemical and biological treatments can be used to convert the ammonia to nitrate or ammonium, to increase the retention of ammonia in the litter, to reduce the odor problem, and to enhance the fertilizer value, but there are additional costs to recover. Some of these processes are recently patented and that have not been fully tested in commercial production.

Recycling Alternatives --- Poultry litter is mostly used as a fertilizer and soil amendment. The nitrogen, phosphate, and potash content of litter are the most common indicators of fertilizer value. It has been either used on the poultry farm or marketed to nearby neighbors. Historic application rates were based on nitrogen needs and resulted in a build up of soil phosphorus over the last 25 years.

Current concerns about excess phosphorus in streams and lakes have led poultry producers to consider other uses such as bio-energy. Poultry litter produces approximately 9.2 million BTUs per ton burned. Analyses were conducted to determine the availability of poultry litter for co-

firing a power plant near Springfield, Missouri. FAPRI estimated that about 150,000 tons were available within 50 miles of the potential power plant and another 450,000 tons within another 50 miles for a total of 500,000 tons within 100 miles.

On-farm use of poultry litter to meet some of the heating needs of poultry production is another alternative litter use. Poultry litter can also be used for livestock feed.

Fertilizer value of poultry litter --- The value of poultry litter fertilizer is based on its nutrient content and soil amendment value. Currently, litter in Missouri is sold for \$5-35/ton with the higher prices being paid in southeast Missouri where it is used to restore soil recently disturbed by land leveling or smoothing for irrigated rice production. A ton of broiler and turkey litter contains about 75 lbs of nitrogen, 75 lbs of phosphate, and 50 lbs of potash. The current commercial nutrient prices are \$0.25-\$0.35/lb for nitrogen, \$0.18-\$0.21/lb for phosphate, and \$0.14-\$0.15/lb for potash. This implies that litter could be worth \$39-\$50/ton. Litter also contains micronutrients and organic material; and substitutes for lime to maintain near neutral soil pH. However, it is more difficult to handle, store, and spread than commercial fertilizer and has application restrictions due to potential pathogens. If not incorporated, \$5.00-\$15.00 of nitrogen value could be lost through volatilization.

Considerable potential exists to add value to poultry litter through chemical or biological stabilization of the ammonia form of nitrogen. Composting or pelleting kills pathogens, but also volatilizes some of the ammonia nitrogen. Pelleting also increases litter storability and spreadability at a cost ranging from \$50.00 – \$75.00/ton.

Energy value of poultry litter for power generation --- Poultry litter's bio-energy value is a function of the price of coal. Using Springfield, Missouri as an example, the cost of BTUs from coal is about \$1.50 per million BTUs. Assuming \$0.11 per ton-mile hauling cost, \$0.50 per ton loading cost, and a grower payment of \$5.00 per ton, we estimate that we have approximately 150,000 tons of litter at a delivered cost of less than \$1.20 per million BTUs, and an additional 450,000 tons with a delivered cost between \$1.20 and \$1.80 per million BTUs. There are likely some costs related to co-firing coal and litter that need to be examined before litter will begin to replace large quantities of coal in power generation, but as fossil fuel costs increase it is becoming competitive. The water quality benefits of reducing the phosphorus loads in southwest Missouri and northwest Arkansas will make this option more competitive as poultry producers are forced to ship litter out of impaired watersheds.

Energy value of poultry litter for poultry house heating --- The value of litter as a heating fuel will increase as fuel costs increase. A litter burner developed in Missouri is now available for \$15,500 plus the cost of a pad, shelter to house it near the poultry house, and duct work to distribute the heat. A little back of the envelope math follows.

The cost of the installed system will likely vary between \$20,000 and \$30,000. The burner can not be turned off and on easily so it would probably be used when chicks are from 1-2 weeks of age in the summer and 4-5 weeks of age in the winter. Heat demands are highest during the early days of growth when the chicks are just developing feathers and require warm house

temperatures. As they increase in size and complete feather development, house temperatures are decreased and their body heat provides much of the heating needs. More heat is required in cooler versus warmer months. Heating needs also vary with outside air temperature.

Assume the average use is 15 days per flock for 6 flocks, the price of propane is \$.90/gallon, and the litter is worth \$10/ton. The burner produces about 500,000 BTUs/hr, which is equivalent to about 6 gallons of propane (a gallon of propane has 92,000 BTUs, assuming 90% combustion efficiency it produces 82,800 BTUs). The burner uses about 100 lb of litter/hour so the value of the litter burned per hour is about \$.50. The value of the 6 gallons of propane replaced is \$5.40 less the litter value (\$.50) or \$4.90. Dividing an estimated cost of \$25,000 by the savings of \$4.90 per hour indicates it will take over 5,100 hours to recover the investment and interest. Assuming 15 days/flock, 6 flocks/year, and continuous operation 24 hr/day, the litter burner would be used 2,160 hours/year. Assuming maintenance costs are minimal, it would take 3 to 4 years to recoup the investment.

Some alternative assumptions to consider:

- the nitrogen replacement value is about \$20 per ton if the farmer currently fertilizes his own pasture assuming no value for phosphorus or potash,
- some farmers may be required to ship their litter out of a watershed and find that their litter has zero or negative value,
- litter ash may have a value as high as \$50/ton of ash or about \$2.50/ton of litter burned.

A few questions remain. How much additional grower labor is required? Does the grower have the time available? How much must he pay for the labor if hired? Finally, what is the market value of the ash produced by litter combustion as a fertilizer or feed product?

Feed value for livestock --- The feed value of poultry litter could be considerable; however, current health concerns have limited the market. There is considerable potential for the development of a feed product if health concerns related to pathogens and antibiotic resistance were eliminated.

The role of litter management--- Litter management must recognize that the poultry litter will be marketed as a product and what the desirable characteristics of the product are, whether feed, fertilizer or energy based. Proper handling of the litter can increase its value for its planned use. For example, stabilizing the nitrogen in a nitrate form or simply quickly incorporating the nitrogen in the soil captures more nitrogen benefits. Incorporation also moves much of the phosphorus into the soil and makes it less likely to move with runoff water.

The litter material should be selected to best meet the planned use. The key is to plan for byproduct production, establish marketing strategies, and work with the industries that will ultimately sell and buy the product.

Missouri Revised Statutes
Chapter 266 Seeds, Fertilizers and Feeds
Section 266.361-400
Soil Amendments

August 28, 2003

Definitions: 266.361. As used in sections 266.361 to 266.400, the following words and terms shall be defined as indicated:

(1) "Person" includes individuals, partnerships, associations, firms, corporations, estates, trusts, trustees, or receivers.

(2) "Soil conditioner" means any substance added to the soil or applied to plants other than fertilizers regulated under the provisions of sections 266.291 to 266.351, RSMo, economic poisons registered under the provisions of sections 263.270 to 263.380 and any substance which is sold to the consumer at a price of less than ten dollars per ton.

(L. 1965 p. 394 § 1)

Sale of injurious or deleterious substance unlawful: 266.371. It shall be unlawful for any person to sell, offer for sale, or expose for sale any soil conditioner in this state containing any substance that is injurious to crop growth or deleterious to the soil.

(L. 1965 p. 394 § 2)

False or misleading statements unlawful: 266.380. It shall be unlawful for any person selling, offering for sale or exposing for sale any soil conditioner in this state to make false or misleading statements concerning the beneficial effect of such soil conditioner on soil, plants, or human nutrition.

(L. 1965 p. 394 § 3)

Penalties for violations--prosecutor to enforce: 266.390. Any person violating sections 266.361 to 266.400 shall be guilty of a misdemeanor, and upon conviction shall be fined not more than five hundred dollars or imprisoned for not more than one year, or be subject to both such fine and imprisonment. It shall be the duty of any prosecuting attorney to whom any violation of sections 266.361 to 266.400 is reported, to cause appropriate proceedings to be instituted and prosecuted in a court of competent jurisdiction without delay.

(L. 1965 p. 394 § 4)

Violations may be enjoined: 266.400. The director of the department of agriculture of this state is hereby authorized to apply for, through the attorney general of this state, and the circuit courts of this state are hereby authorized to grant, a temporary or permanent injunction restraining any person from violating or continuing to violate sections 266.361 to 266.400, notwithstanding the existence of other remedies at law, said injunction to be issued without bond.

(L. 1965 p. 394 § 5, A.L. 1978 H.B. 1634)

Effective 1-2-79